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GEODESY

Uncle Sam's Life-Saving Surveyors

By N. H. HECK

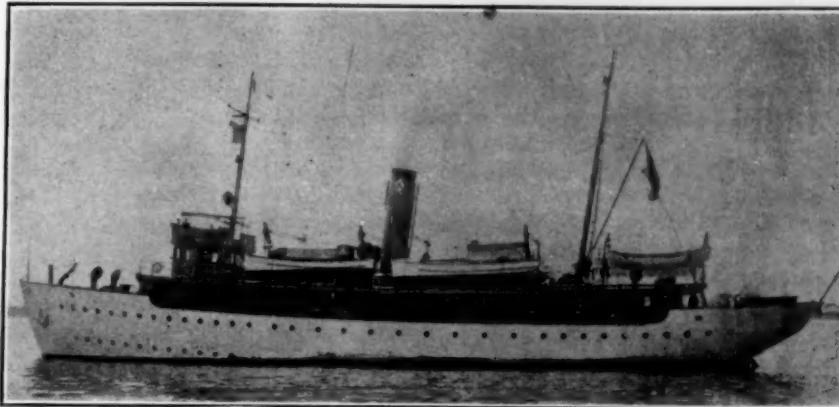
Commander Heck is in charge of the Division of Terrestrial Magnetism and Seismology of the U. S. Coast and Geodetic Survey.

If you were going to plan a garden in your back yard, you wouldn't worry because the garden lay on a curved surface—the surface of the earth. But if you were confronted with the job of surveying an entire continent, or 3,000 miles of coast line, the earth's curvature would be an important factor. Imagine, then, being pals with a giant globe, 25,000 miles in circumference, that is whirling at the rate of four miles a second. Imagine a surveying job so big that the curvature of the earth must be taken into account. That's the job of the engineers of the United States Coast and Geodetic Survey.

Now, the Coast and Geodetic Survey has sometimes been called "The Government Bureau with the name nobody knows." Briefly, its scientists and engineers make the charts which guide the mariner upon the high seas, and also they make the control maps upon which all detailed mapping is based.

So it happens that the Survey's fleet of ships sails ahead of the mariner and makes the charts which are later followed in the commerce of the sea. This brings about a somewhat peculiar situation. The U. S. Coast Guard is charged by law with protecting life and property along the coasts of the United States and its possessions. Nevertheless, the ships of the Coast Guard cannot be everywhere at the same time, and because the Coast and Geodetic Survey ships are usually in more or less dangerous waters, these ships are frequently called upon in the saving of life and property. They are obeying the law of the sea in this work—a higher law than any man-made statute.

In the Washington office of the



THE SURVEYOR, one of the U. S. Coast and Geodetic Survey's fleet of vessels for charting our coast lines, but which, on occasion, act as life savers

Coast and Geodetic Survey there hangs a memorial plaque commemorating a feat of valor on the part of the officers and men of the Survey ship *Patterson* in rescuing the Coast Guard Steamer *Tahoma*. The *Tahoma* was wrecked on a reef on the western Aleutian Islands in Alaska in September, 1914. The Survey Ship *Patterson*, James B. Miller commanding, made a voyage of 1,600 miles through dangerous, uncharted waters to its relief in response to an urgent call by wireless. A letter from Commander Miller to the Director of the Coast and Geodetic Survey just as the *Patterson* was starting on its mission of mercy stated: "I am fully aware that this is a most hazardous trip with this vessel, approaching foolhardy, but the circumstances are serious in the highest degree and admit of no delay. According to reports, the *Tahoma* struck 24 hours ago and is fast breaking up. There are 87 persons on board. The *Patterson* is two days nearer than any other vessel."

The letter, which in Commander Miller's heart, he undoubtedly felt was his goodby to the world, ended with this sentence: "I trust this action of mine in going to the relief

of this ship will be approved as it appears to the best of my judgment to be my plain duty, and the case is an extreme one."

Fortunately, the *Patterson* came through with flying colors, rescued the survivors of the *Tahoma*, and returned to its Survey working grounds none the worse for the experience. This, you may say, is bravery. But, after all, what is bravery? The sailor has a code—the tradition of the sea—and he is more afraid to break that code than to follow it even though he knows that by so doing he is going to certain death.

During the world war the British Admiralty sent out an order commanding all ships to refuse to go to the aid of any disabled vessels. This was because of the submarine menace, which in the opinion of the British high command, would result in larger loss of life than to refuse aid to distressed ships. The order, given in good faith and with the best of intentions, was one of the hardest things the British sailor ever had to contend with. As a matter of fact, there are at least rumors to the effect that the order was dis-

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Life-Saving Surveyors

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regarded in more than one instance because the commander of the ship had to choose between the mutiny of his crew and the breaking of the order.

Just the other day the Canadian Pacific Liner *Princess Charlotte*, southbound through Alaskan waters, ran aground in Wrangell Narrows. Her SOS calls were picked up by the Coast and Geodetic Survey Ship *Explorer*, working in the vicinity. The *Explorer* got under way immediately and after an all night run through a dense fog reached the *Princess Charlotte* at 4 o'clock in the morning. Two hundred and sixty-seven passengers were removed and taken to Wrangell, Alaska.

Last July, the Survey Ship *Marinduque* went to the assistance of the British Steamer *Taipeng* aground on Cap Island in the Philippines, removed all passengers and took them to the nearest port. Not so long ago the Spanish Royal Mail Line Steamer *Fernando Po* stranded on a rock in the Sulu Sea, Philippine Islands. The Survey Steamer *Pathfinder*, then at anchor among the maze of coral reefs off Palawan Island, received the distress calls, went to the assistance of the stranded steamer, a distance of 1800 miles, took off 59 passengers, and took both passengers and mail to a port of safety.

Many other instances might be cited but they all sum up into one fact: that the Government agency charged with charting the coasts of the United States and its possessions is, because of the very nature of its work, a most efficient life saving agency.

This matter of saving lives on the high seas appeals to the imagination. Saving 267 passengers from the Steamer *Princess Charlotte* sounds like an achievement, yet, in its everyday work of surveying, the Coast and Geodetic Survey probably saves

more lives in the aggregate every year than could be packed on a thousand steamers such as the Steamer *Princess Charlotte*.

Twenty years ago navigation in Alaskan waters was a decidedly hazardous undertaking. Up there, murderous pinnacle rocks poke their spires up through deep waters, lying in wait to tear the entrails from unwary vessels. And twenty years ago the majority of these rocks were not charted. The mariner had to take his chances.

Those pinnacle rocks, many of them, are named. They are named after vessels which have been wrecked on them. Today, practically every one of those rocks is placed definitely upon the charts of the United States, and ships are safe to traverse Alaskan waters as a consequence.

The marine losses in Alaska during the last 5 years were only \$481,000, although Alaskan commerce is more than 4 times greater than a few years ago. Yet, from 1916 to 1920, a four-year period, the marine losses in Alaska were over three and a half million dollars, to say nothing of loss of lives.

Up in New England, where for 300 years they have bred the finest kind of sea-faring men, the same kind of dangerous rocks as are found in Alaska have been discovered and charted by the Coast and Geodetic Survey during the last twenty years. On one occasion just as one of these dangerous rocks was being discovered a great battleship passed a few hundred yards away in complete ignorance of her danger.

In the old days, going down to the sea in ships was an undertaking only a little less hazardous than attempting to cross the Atlantic by airplane. Today, with larger ports and improved navigational instruments, ocean travel is less dangerous than a ride in a flivver. But these

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PHYSICS

"Nebulium" May Be Oxygen

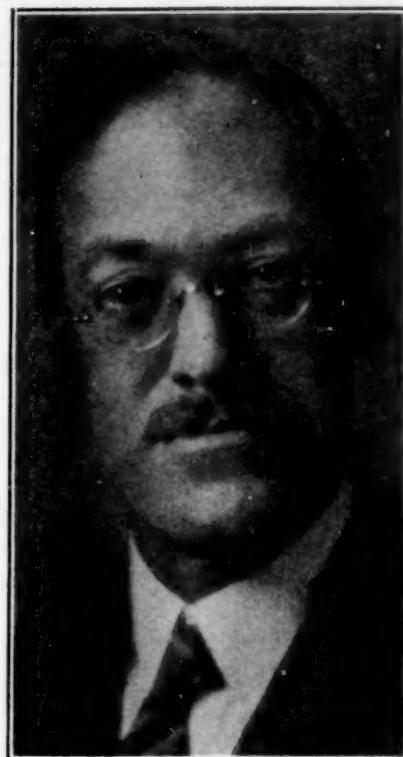
Nebulium, the strange "element" that has been supposed to exist in such bodies as the great cloud of glowing gas in the star group of Orion, seems to be nothing but oxygen and nitrogen, of which we take in about a pint every time we breathe. This is the opinion of I. S. Bowen, of the Norman Bridge Laboratory of Physics.

Following the discovery of helium, first as a strange line in the spectrum of the sun, and then as an actual element on the earth, a mysterious group of lines was found in the spectra of some of the nebulae. As most of the spectral lines are known to be due to certain elements, it was thought that the strange lines, of which one was green, might be due to an element as yet undiscovered.

Dr. Bowen's studies now indicate, however, that these lines are due at least partly to oxygen and nitrogen, of which the air is chiefly composed, but in what is termed the "metastable state." While in the laboratory atoms of certain gases can be induced to enter this state, they ordinarily return to the normal condition without giving off light, by bumping into another atom or the walls of the tube. In the nebula, however, the pressure is very low, probably much lower than the lowest terrestrial vacuum, which means that the atoms are not so crowded. They are therefore less apt to bump into each other, and the walls of the tube are absent. The result is that the atoms remain longer in the metastable state, and finally return to the normal condition spontaneously. According to Dr. Bowen's calculations, if this happened, light would be given off of the same wavelengths as the mysterious nebrium lines.

Dr. Bowen reported his conclusions recently to the British scientific magazine *Nature*. In a later issue, Prof. A. Fowler, a leading English authority on the subject, states that the evidence, on the whole, "appears to be in favor of Mr. Bowen's suggestions." He also suggests that one of the lines, in the part of the spectrum just beyond the red end, should be accompanied by a fainter line, on the side towards the visible spectrum. If astronomers can discover this in the spectrum photographs of the nebulae, it would be strong evidence in favor of Dr. Bowen's views.

PLANT INDUSTRY



WILLIAM ALLEN ORTON

The Newer Conquistador

We use the word "conquest" in two widely different senses, frequently even when we apply it to the same thing. The conquest of the tropics, sixteenth century style, was something very remote from the conquest of the tropics in the manner of the twentieth century. Then, the *conquistadores* fought the men they found in the territories they invaded, and robbed and killed them or at best allowed them to survive as chattel slaves for the purpose of a closer extractive exploitation of their country. Now, the foreigner seeks smaller but more numerous and more difficult enemies—*insects*, *bacteria*, the *fungi* that cause plant disease, and his conquests benefit the native as well as himself.

The newer view of the tropics, which envisages them as regions that must eventually become major instead of minor factors in the support of the world's population, finds one of its most active and best-informed exponents in Dr. W. A. Orton, scientific director and general manager of the Tropical Plant Research Foundation. This institution devotes itself to the solution of the problems in plant industry that beset the owners of tropical plantations and forest lands, and although it is not an old establishment it already has to its credit the clearing up of a number of difficult questions in plant pathology,

soil fertility, economic entomology and other phases of tropical agricultural science.

Although his birth and education were strictly of stony and chill New England, Dr. Orton displayed an interest in plant problems of warmer regions from his first connection with the U. S. Department of Agriculture in 1899, when he was placed in charge of cotton, truck and forage crop disease investigations. A variety of problems in plant pathology continued to hold his attention as long as he remained with the department. His transfer to his present position took place in 1924.

Science News-Letter, November 12, 1927

METEOROLOGY

New Flood Like Johnstown

The great flood which caused such a loss of life and property damage at Montpelier, Vermont, on November 4 was similar in many respects to the famous Johnstown flood. Unlike the Mississippi floods, the great damage in Vermont was not done by the river, but by the breaking of the big reservoir above the city, according to H. C. Frankenfield, of the flood division of the U. S. Weather Bureau.

"There would have been floods with some damage in any event," Mr. Frankenfield said, "and this was foreseen by the Weather Bureau. But of course we could not foresee the breaking of the reservoir. With unusually heavy rains Thursday night—4 inches was the report from the Concord, N. H., station, not far away—the reservoir gave way the following morning, and this did the great amount of damage.

"Montpelier is in the Winooski River valley, which drains into Lake Champlain, but the Connecticut River is also swollen. Just how high the upper river became we cannot say, because the river gauge at Bellows Falls was carried away when it registered 20 feet. Then it had already broken the previous record for this location of 19 feet, which was made on March 28, 1913. By Sunday night the crest of the flood was expected to reach Hartford, perhaps reaching a height of 26 feet. The record at Hartford was made in 1854, when the river attained 29 feet.

"Such floods as these in this part of the country are most unusual at this time of year. Ordinarily they occur in the spring."

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Neanderthalers Ancestors

That Neanderthal man was a direct ancestor of modern man, and not merely a side shoot from the evolutionary stem, is held out as a definite scientific possibility by Dr. Ales Hrdlicka, noted American anthropologist. Speaking in London on November 8 on the occasion of the award to him of the Huxley Memorial Medal of the Royal Anthropological Society, Dr. Hrdlicka called in question the widely accepted belief that this ancient, low-browed race was a people apart from modern humanity, and was entirely exterminated by an invasion of the early Cro-Magnon race, leaving no descendants.

While emphasizing the necessity for much further excavation and search for materials to supplement the present collections of skulls, bones and implements, Dr. Hrdlicka indicated that even the fragmentary data now in hand suffice to cast considerable doubt on present widely accepted theories.

In geological sequence, in his relation to the animals among which he lived and which supplied his food, in his choice and use of shelters and caves, in his art and implements, and above all in his bodily structure, Neanderthal man fits into the evolutionary picture. In his beginnings, he grades off into the little-known races that preceded him, and at his end he grades off similarly into the better-known race that followed.

Even in the crucial matter of skull shape and proportion, Dr. Hrdlicka pointed out, Neanderthal man is not so sharply marked off from modern man as we commonly assume. The more typical skulls do display marked characteristics, such as a low, flattened top of the braincase, heavy eyebrow ridges reminiscent of the gorilla, a jaw very massive but lacking in chin, and a very primitive type of teeth. But among the collection can be found skulls that depart from the type. One shows a higher cranial arch, another has eyebrow ridges of a less apelike type, a third displays a remarkably "human" tendency in the shape of the upper jaw and palate, and so on. These departures from type, Dr. Hrdlicka said, indicate that evolution was actively at work in the race, and that it was not a fixed and static type which could not give rise to a new kind of humanity. It would be more proper, in his opinion, to refer to a Neanderthal phase in human development.

(Just turn the page)

Tail Tells Tales

Mesopotamia, the land of the traditional Garden of Eden, as well as the adjacent regions in Asia Minor, once had a cooler, moister climate than it has at present. The secret of this discovery was hidden in the curve of a sculptured tiger's tail, the significance of which was recently pointed out by a well-known German orientalist, Dr. Max Hilzheimer.

Dr. Hilzheimer points out certain peculiarities in a sculptured figure of an animal of the cat family, excavated from some very early Hittite ruins. At first it was thought to be a somewhat conventionalized lion, but in the absence of any mane and, even more to the point, in the total lack of a terminal tuft on the tail, its character was considerably in doubt. The matter was settled by the peculiar crook at the very end of the beast's tail, which tigers always show and lions never.

But tigers are forest animals, demanding a more humid climate than the land now affords; though lions find the semi-desert and even severely arid country between Africa and the Asian mainland habitable enough. This, plus the frequent occurrence in Mesopotamian art of such temperate and subtemperate animals as the European bison, the wild goat,

(Just turn the page)

Prevents Blood Clotting

From the livers of dogs, Prof. W. H. Howell of the Johns Hopkins University has prepared an anti-coagulant that will keep a sample of blood in a practically normal condition for 24 hours.

Clotting is nature's protection against bleeding to death, but this tendency of the vital fluid to congeal after its exposure to the air offers serious disadvantages in blood transfusions and certain types of important experimental work. This new clot-preventing substance, which has been named heparin, is of great interest, therefore, to surgeons, pathologists and other specialists who deal with blood, particularly those who make the various blood tests used in detecting disease.

Heparin was obtained and used by Professor Howell in a crude form several years ago, but recent research has yielded this purified and potent form, the action of which is very much more powerful. One milligram of 100 cubic centimeters of blood will prevent the sample from clotting. Injected into the blood of persons in the

(Just turn the page)

NATURE RAMBLINGS

By FRANK THONE



Bagworm

Now that the leaves have disappeared from trees and shrubs, you will find in your garden many strange fruits which perhaps you did not notice during the summer when they were better concealed. All manner of butterflies and moths are ripening in multiform chrysalises suspended on twigs or tucked away in cracks in the bark. Many of them may well be left unmolested, for the insects that will hatch from them are both beautiful and harmless, but there are some which had better be destroyed whenever and wherever they are found.

Prominent among these is the curious cocoon of the bagworm. This will be found suspended freely by a loop of gray silk, not firmly fastened along one side to a twig or glued into a crack, like the majority of such objects. It is more conspicuously identified by the armor of short bits of stem which the larva worked into the walls while it was spinning itself in. These tiny logs offer resistance to the beaks of birds and to the attacks of other enemies, and thus increase the creature's chances of survival.

The bagworm is peculiar among caterpillars in that it spends its entire larval life inside its cocoon, instead of spinning itself in only when ready to retire for its winter sleep of metamorphosis. Its summer bag is thinner, and is usually ornamented with bits of leaves, but otherwise is the same sort of covering that serves in winter.

Bagworms are among the most destructive feeders on the foliage of ornamental and shade plants, and it behooves every householder to pluck off and destroy their cocoons before warm weather causes the winged insect to emerge and scatter another crop of eggs.

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Thirty automobiles in France have completed a three weeks' tour, using various substitute fuels for gasoline.

Tail Tells Tales

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the true long-horned buffalo and the aurochs or extinct wild ox, indicate a climate more like that found several hundred miles farther north.

That the earliest recorded inhabitants of this region, the Sumerians, were originally mountaineers of the North is indicated by the primitive signs in cuneiform writing, which they originated. Prof. Eckhard Unger of the University of Berlin has examined large numbers of their inscribed tablets, reading the riddle of their picture-writing. The basic signs, he says, are all indicative of a northern origin and mode of thought.

The animals with the simplest names are those of the north, such as dog and donkey. Lions, which they first met on the Mesopotamian plain, have no name of their own, but are called "big dogs." Names of such animals as antelope and gazelle are similarly derivative compounds. "East wind" is written "mountain wind." Their oldest gods are mountain gods.

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Long before the day of medieval castles surrounded by moats, prehistoric men built houses on piles driven into lake bottoms for protection against beasts and enemies.

Stops Blood Clotting

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same proportions, heparin will entirely prevent coagulation for about an hour. This property is gradually eliminated, however, Professor Howell has found, in about three hours' time, when blood from such patients will clot as usual.

The chemical analysis of heparin is not entirely complete, but it appears to be a carbohydrate. It seems to be perfectly stable, said Professor Howell, for specimens kept all summer in the Johns Hopkins laboratory remained unchanged and show no signs of deterioration either chemically or from the action of bacteria or mold. It has the additional advantage of being able to withstand sterilization and boiling without harm.

Science News-Letter, November 12, 1927

Indians of South America made surgical use of the powerful jaws of leaf-cutter ants by making an ant take hold of the two sides of a wound and drawing it together. The ant's body was then cut off, leaving an automatic clip.

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Neanderthalers Ancestors

(Continued from page 309)

opment rather than to a Neanderthal species of man.

The vexed question whether Neanderthal man appeared in Britain before or after the glacial period is now considered settled in favor of the earlier date, according to J. Reid Moir, noted English anthropological authority. Mr. Moir is chairman of a committee of scientists appointed to examine the clay beds at Hoxne, Suffolk, which have yielded large numbers of implements made by Neanderthal man.

The structure of the beds, as pieced together from many excavations, shows a thick layer of glacial boulder clay, indicating a long period of intense cold, above the stratum in which the most primitive man-made implements of this locality are found. Overlying this glacial layer was a second bed containing stone tools of the Old Stone Age, but of a more advanced type than the first. Then another deposit of the type laid down during cold times, and finally the present ground surface, beneath which were found relics of the New Stone Age. The intervention of two cold-period beds above the level of the earliest implements is regarded as conclusive evidence of glacial man in Britain.

Science News-Letter, November 12, 1927

Crime costs the United States about three billion dollars a year.

Owls from the United States have been shipped to one of the South Sea Islands to fight a plague of rats.

A seventeenth century writer commented that in some parts of Germany no young farmer was allowed to marry until he had planted a given number of walnut trees.

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First Clothes Flychasers

Primitive man and his wife first took to wearing clothes in order to keep off stinging flies, sharp-billed mosquitoes, cooties, fleas, and other lively pests. This simple answer to the puzzle problem: "How did we come to wear clothes, anyway?" is advanced by Dr. Knight Dunlap, professor of psychology at Johns Hopkins University.

"Crawling and flying pests are with primitive man abundantly and very intimately," Dr. Dunlap points out, in a paper to appear in the first issue of a new scientific publication, the *Journal of General Psychology*.

Skins or cloth might be wrapped tight around the body for protection against stings and bites, but this is confining and in warm climates impossible.

"Much more efficient protection is afforded by hanging strings, leaves, strips of hide, animals' tails, and similar articles so that they will flap with the movements of the wearer," he says. "In other words, the best fly chasers are exactly the garments most characteristic of savages and primitive man. These afford protection without undue warmth or exclusion of ventilation.

(Just turn the page)

Shows Cretan Heaven

The first clue to the heaven pictured by the ancient inhabitants of the island of Crete is found on a gold funeral pendant, just described by Sir Arthur Evans, noted British authority on old civilizations of the Mediterranean. The pendant was discovered twenty years ago in a tomb at Pylos, in Greece, but it was not officially described at the time, although the find was reported as a remarkable one. The jewel was popularly named the "Ring of Nestor" because Pylos was the home of this hero of Homer's *Odyssey*. The ring attached to the pendant is too small, however, to have been worn on the finger.

Sixteen little figures are carved in the oval of the pendant, Sir Arthur states. The picture is divided into four sections by a tree trunk with two cross branches. The upper left section contains a seated goddess and her companion amusing themselves while butterflies flutter about their heads and a young woman nearby welcomes her sweetheart. In the upper right section is a lion at

(Just turn the page)

Life-Saving Surveyors

(Continued from page 306)

improved conditions call for improved charts—and the Coast and Geodetic Survey today is bending every energy toward producing the sort of chart which will be of the greatest value in connection with improved methods of navigation.

On the Pacific Coast, for instance, vessels now and then run ashore in spite of modern aids to navigation because in darkness and fog they are at the mercy of the changeable currents. The new automatic echo sounding device makes it possible for a ship at full speed to measure the depth of the water. In this way, the mariner can recognize every hill and valley in the bottom though it may be half a mile below him, and if these are correctly placed on the chart he knows as definitely where he is as does the traveller on land when he recognizes familiar landmarks. This can only be done, however, if the charts are complete and correct and during the last ten years the Coast and Geodetic Survey has been busily engaged on the Pacific Coast in making charts which will meet this test even out of sight of land.

Think what modern navigational charts mean to the United States. No country is so rich that it can afford out-of-date maps and charts and it is because the United States has probably the finest marine charts of any nation in the world that commerce proceeds safely and passengers and freight are brought into all the great sea ports in greater safety than passengers and freight are brought into any railroad terminal in the world.

It is not merely one kind of ship which benefits from this work but the needs of all are provided for from the great battleship, the swift destroyer, the submarine, the great ocean liner and the coasting steamers, down to yachts, pleasure crafts, and the small motor boats used for fishing.

It would be possible to go on almost indefinitely telling of the achievements of this, the oldest scientific bureau in the United States Government, but to detail 111 years of progress is something hardly possible in a short article. In my office I have a large bookcase filled with about 90 weighty-looking books. Those books give in detail the work of the Survey from the time President Jefferson first authorized its formation in 1807. It is a long story, and one of fascinating interest,



PINNACLE ROCKS, such as this one, were a continual menace to navigation in Alaskan waters until the Coast and Geodetic Survey charted them accurately

but for the present we need only remember that Uncle Sam's Coast and Geodetic Survey is saving lives and saving property worth millions of dollars.

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There are 500 muscles in a man's body.

Nectarines are peaches with a smooth skin.

Humpback whales can travel 30 miles an hour.

Bears will eat practically any edible material.

The cow tree produces a milky sap which may be drunk.

The Welsh language is dying out, according to census reports.

Asoka, an emperor in India in the third century B. C., issued an edict commanding that shade trees be planted.

The town of Hammerfest, Norway, lying 300 miles north of the Arctic Circle, has an average winter temperature warmer than New York.

It is reported that a Swedish engineer has invented a new road pavement which does not become slippery when wet.

A new instrument for testing incandescent lamps records changes of electric current as small as one-tenth of a thousandth of a millionth of an ampere.

First Clothes Flychasers

(Continued from page 311)

"The fly protections we have customarily used on our domestic animals are exactly of the types of primitive human clothing which have baffled the early anthropologists."

Ornaments such as nose rings, leg bands of fur, peculiar haircuts, and designs tattooed in the skin were originally badges of identity, Dr. Dunlap concludes. Ornaments were, and still often are, worn to distinguish an individual as a member of a certain tribe. To the initiated, such regalia shows whether the wearer is a married man or a bachelor, how many men he has killed in battle, and how many cows he owns.

There have been but four theories of the origin of clothing, the psychologist states. These are: First, the modesty theory (covering up the body); second, the immodesty theory (making the body mysterious and alluring); third, the adornment theory; and fourth, the utility or protection theory, with which Dr. Dunlap's explanation fits.

"Clothing itself is not modest, or immodest," he says. "Any degree of clothing including complete nudity, is perfectly modest as soon as we become thoroughly accustomed to it."

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Shows Cretan Heaven

(Continued from page 311)

rest. In the lower half of the oval is a Cretan goddess, with a griffin seated before her and griffin-headed attendants bearing offerings. Other attendants lead the same pair of lovers toward the group. The lover in this scene is assisting his lady to climb over the tree roots toward the goddess. The scenes are interpreted as telling a story of both sides of the grave, showing how the people of this famous civilization regarded the crossing over into a future world.

Although the pendant was found on the mainland of Greece it is considered a work of art from Crete, because the style so closely resembles the frescoes at the famous Palace of Knossos, in Crete.

A number of seals and rings found near the Greek town of Mycenae have also been studied by Sir Arthur, and these tiny carved pictures are cited as valuable evidence of the close connection between the people of Crete and those of the Greek peninsula.

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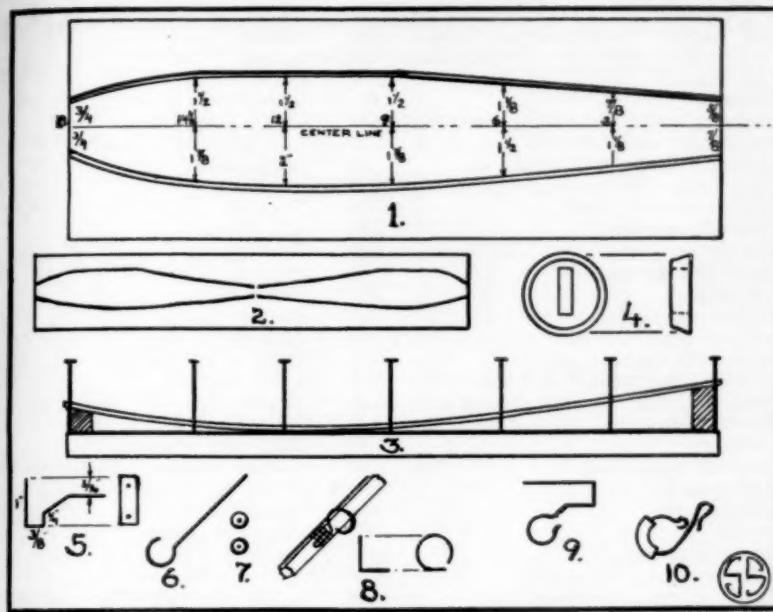
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Building and Flying Model Airplanes



Making the Fuselage Frame

This is the thirteenth of a series of articles by Paul Edward Garber, telling how to make model airplanes. Mr. Garber is in charge of aeronautics at the Smithsonian Institution.

Because the wood used for the fuselage requires to be steamed and formed, the construction of this part will be a two-day job, therefore we will describe the fuselage in two installments. The first thing to do is to take four sticks of wood, slightly larger than $\frac{1}{8}$ " square and eighteen inches long, and steam them. The steaming may be done by laying them in a pan of boiling water for $\frac{1}{2}$ hour, by laying them in a tube through which hot steam is passed, or by wrapping them in hot wet cloths which shall be constantly kept hot and wet for at least half an hour. While these sticks are steaming start construction of the forms.

Figure 1 in the drawing shows how the forms are laid out. On the 36" board draw a full size replica of the above Figure 1 and also an opposite of it. In other words for the opposite drawing have the tail end of the drawing at the left and the nose at the right with dimensions reversed as shown in Figure 2. At the points marked with the arrow points drive in ten penny nails. This completes the preliminary laying out of the form. When the wood has sufficiently steamed lay one piece against each row of nails and retain them there with other nails placed outside of the sticks. It will be necessary to bend the wood in a double curve. To do this place blocks of wood under the ends of the sticks, and hold down

the center with small staples, lightly driven in, so as to not bruise the sticks. Figure 3 shows how this is done, using $\frac{3}{4}$ " blocks at the nose ends and $1\frac{1}{2}$ " blocks at the tail ends. Other blocks may be used to preserve the shape between. It will be necessary to let the wood stay in these frames over night—24 hours would be better, in order that the wood can thoroughly dry and become set in its shape.

In preparation for future work you can make a few fittings. Figure 4 shows two views of the nose piece. It is to be made out of a small piece of wood, such as pine or spruce. The ideal way to make it would be on a lathe, but it can be easily cut out with a saw and penknife and sandpapered or filed true. Lay out the circle on a $\frac{1}{2}$ " piece of wood and after it is cut out and beveled, make the hole. This may be carved out with a knife, or two $5/16$ " holes may be bored with their opposite edges 1" apart, and the intervening wood and corners cut out. Be careful not to split the wood in this process.

Figure 5 shows two views of the propeller bearing. It is to be made of a strip of flat metal $\frac{7}{8}$ " long. No. 16 gauge aluminum is preferred, but if unobtainable a piece of one of the beaters taken off the egg-beater described previously may be used. The metal is bent as shown and a No. 52 hole bored through the lower portion, and through the upright.

Figure 6 shows the propeller shaft which is to be bent from a 3" piece of hatpin wire or 15 piano wire. Figure 7 shows the type of washers

which are to be used to reduce friction between the propeller and bearing. They are $\frac{1}{4}$ " in diameter with a $1/16$ " hole. Dress spangles may be substituted. Figure 8 shows three views of a can or rubber guide, similar to those used on the previous models. Two are required and are formed from $2\frac{1}{2}$ " lengths of small wire, such as No. 10 piano wire. Figure 9 shows the type of hook which we will use on the tail of this model. It is made from a $2\frac{3}{4}$ " length of hatpin wire. Figure 10 shows an "S" hook used to hook the rubbers onto the tail hook. It is made similarly to that described in Article 10, from No. 10 piano wire or equivalent. It will be noticed that it has the safety feature, and that on its loop is strung a piece of rubber insulation or other tubing to protect the rubber strands from cutting.

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ETHNOLOGY

Why Indian "Queens" Worked

Quotation from THE AMERICAN INDIANS AND THEIR MUSIC—Frances Densmore—Woman's Press.

The position of women among the Indians has been greatly misunderstood. This is natural, as the early observers of Indian customs came from Europe in the age of chivalry. At that time the feudal system had provided servants for people of wealth, and the frequent wars had placed around women an atmosphere of romance. Nothing could be more widely different than the social conditions in Europe and among both colonists and Indians in America. The wives of the colonists were hard-working women and expected to share with men the hardships of their new mode of life, but the terms "kings, queens, and princesses" had been applied to Indians and could not easily be freed from their accustomed meaning. A queen in Europe did not work, but the wife of an Indian "king" frequently carried on her back the material for an entire dwelling; it appeared, therefore, that she was no better than a slave.

In the old days an Indian woman might be seen toiling along with a heavy load of camp equipment and, perhaps, with a baby on her back, while her husband, tall and vigorous, walked in front of her. He did not do this because of any lack of respect or affection, but in order to "make the way safe" for her. How could a man defend his wife and himself against an ambushed enemy if he carried a kettle in each hand and a pack on his back?

Science News-Letter, November 12, 1927

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GR	Folklore.
GT	Manners and customs.
GV	Sports and amusements. Games.
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HD	Economic history. Agriculture and Industries.
HE	Transportation and communication.
HF	Commerce.
HM	Sociology. General.
HQ	Family. Marriage. Woman.
HV	Social pathology.
L	Education.
M	Music.
N	Fine arts.
P	Philology and linguistics.
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QA	Mathematics.
QB	Astronomy.
QC	Physics.
QD	Chemistry.
QE	Geology.
QH	Natural history.
QK	Botany.
QL	Zoology.
QM	Human anatomy.
QP	Physiology.
QR	Bacteriology.
R	Medicine. General.
S	Agriculture. General.

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SD	Forestry.	460	Spanish
SF	Animal culture. Veterinary medicine.	470	Latin
SH	Fish culture and fisheries.	480	Greek
SK	Hunting. Game protection.	490	Minor Languages
T	Technology. General.	500	NATURAL SCIENCE—
TA	Engineering. General.	510	Mathematics
TC	Hydraulic engineering.	520	Astronomy
TD	Sanitary and municipal engineering.	530	Physics
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TF	Railroads.	550	Geology
TG	Bridges and roofs.	560	Paleontology
TH	Building construction.	570	Biology
TJ	Mechanical engineering.	580	Botany
TK	Electrical engineering and industries.	590	Zoology
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Classics of Science:

Whiteness Compounded of Colours



Fig. 9.



Fig. 10.

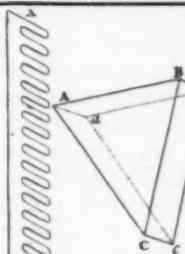


Fig. 11.

Newton explains his arrangement for obtaining white light from two spectra: "If the most refrangible rays (blue) coming from the superior Prism take up all the space from M to P, the rays of the same sort which come from the inferior Prism ought to begin at P, and take up all the rest of the space from thence towards N"

OPTICKS: OR, A TREATISE OF THE REFLEXIONS, REFRACTIONS, INFLEXIONS AND COLOURS OF LIGHT, by Isaac Newton, London, MDCCIV.

In the following experiments Newton proved the fact, not understood in his day, that white light is composed of the several colors of the spectrum. First he combined the spectra cast by prisms, showing that colored lights mix to form white light. Next he mixed pigments to form a neutral gray, and showed that gray may be considered a shade of white.

Two prisms and a common comb with coarse teeth are needed for the first experiment. For the second, substitute modern pigments, in approximately the following proportions: chrome yellow, 3 parts; ultramarine blue, 1 part; red iron oxide, 1 part, as it is impossible to duplicate the pigments which Newton used—"Orpiment, blue Bise, Viride Aeris, and a certain purple which Painters use."

Sun's Light Compounded of Colours

Let two prisms ABC and abc, whose refracting angles B and b are equal, be so placed parallel to one another, that the refracting Angle B of the one may touch the Angle c at the base of the other, and their planes CB and cb, at which the rays emerge, may lie in directum. Then let the Light trajected through them fall upon the Paper MN, distant about 8 or 12 Inches from the Prisms. And the Colours generated by the interior limits B and c of the two Prisms, will be mingled at PT, and there compound white. For if either Prism be taken away, the Colours made by the

other will appear in that place PT, and when the Prism is restored to its place again, so that its Colours may there fall upon the Colours of the other, the mixture of them both will restore the whiteness.

This Experiment succeeds also, as I have tryed, when the Angle b of the lower Prism, is a little greater than the Angle B of the upper, and between the interior Angles B and c, there intercedes some space Bc, as is represented in the Figure, and the refracting planes BC and bc, are neither in directum, nor parallel to one another. For there is nothing more requisite to the success of this experiment, than that the rays of all sorts may be uniformly mixed upon the Paper in the place PT. . . . This is the reason of the composition by which whiteness was produced in this Experiment, and by what other way soever I made the like composition the result was whiteness.

Lastly, If with the Teeth of a Comb of a due size, the coloured Lights of the two Prisms which fall upon the space PT be alternately intercepted, that space PT, when the motion of the Comb is slow, will always appear coloured, but by accelerating the motion of the Comb so much, that the successive Colours cannot be distinguished from one another, it will appear white.

Grey Colours Compounded

Lastly, in attempting to compound a white by mixing the coloured Pow-

(Just turn the page)

ANTHROPOLOGY

Stone Age Skulls in Africa

What was the strange race of men that lived in equatorial Africa in the twilight time between the Old Stone Age and the New?

An English anthropologist, L. S. B. Leaky, who has been conducting extensive excavations in Kenya Colony, brings back with him a budget of extremely puzzling skeletal remains but refrains for the present from offering any answer to his own riddles.

Most of the bones he found at his two principal working locations, Mr. Leaky states, were badly broken, but he did find at least one skeleton in nearly perfect condition, and several good skulls. The skulls are most extraordinary. They do not resemble the skulls of the Negroes now inhabiting the locality at all, and they are very little like any Negro skulls, except that they are very narrow for their length.

Their faces, however, are high and narrow instead of being short as typical Negro faces.

One of the most notable characteristics that marks these skulls as non-negroid in aspect is the very narrow (Just turn the page)

CHEMISTRY

More Methanol From Wood

Double the yield of methanol, the common denaturant of alcohol, may be obtained by distillation of wood under high pressure with hydrogen. This discovery was made by P. K. Frolich, H. B. Spalding and T. S. Bacon of the Massachusetts Institute of Technology. If this process proves to be practical and profitable on a commercial scale it may be the salvation of the wood-distillation industry of America, which has been hard hit within the last two years by the importation of cheap methanol made in Germany by combining carbon monoxide and hydrogen.

It may also enable the United States to meet the coming competition of the new German process of making synthetic gasoline, carbolic acid and the like from coal and steam. The investigators have found that wood may be almost completely converted into gaseous and liquid products by heating with hydrogen under a pressure of 3000 pounds per square inch, using nickel as a catalyst to assist the combination. Many of these products would be serviceable for motor fuel or might replace organic chemicals we now obtain by the fermentation of grain.

Stone Age Skulls in Africa

(Continued from page 315)

nose-opening. The average Negro, of course, has always been noteworthy for his wide nose. One of the skulls also exhibits a most extraordinarily high palatal arch. The top of the palate is 29 millimeters, or over one and one-eighth inches, above the grinding surface of the teeth. This is seven millimeters higher than the corresponding measurement in the average European mouth, and 13 millimeters higher than that in a number of Negro skulls measured locally.

Associated with the human remains were many stone arrow and spear points and bits of pottery. The workmanship corresponds in a general way with that of similar finds in Europe belonging to the transition period between the Old Stone Age when men used chipped stone implements, and the New Stone Age, when the art of a finer polished finish was discovered.

Science News-Letter, November 12, 1927

Paintings on the walls of African caves made by Bushmen in prehistoric times show that this race has since slipped back to a lower level of culture.

BINDER COVERS FOR SCIENCE NEWS-LETTER

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Whiteness Compounded

(Continued from page 315)

ders which Painters use, I considered that all coloured Powders do suppress and stop in them a very considerable part of the Light by which they are illuminated. For they become coloured by reflecting the Light of their own Colours more copiously, and that of all other Colours more sparingly, and yet they do not reflect the Light of their own Colours so copiously as white Bodies do. If red Lead, for instance, and a white Paper, be placed in the red Light of the coloured Spectrum made in a dark Chamber by the refraction of a Prism, as is described in the third Experiment of the first Book; the Paper will appear more lucid than the red Lead, and therefore reflects the red-making rays more copiously than red Lead doth. And if they be held in the Light of any other Colour, the Light reflected by the Paper will exceed the Light reflected by the red Lead in a much greater proportion. And the like happens in Powders of other Colours. And therefore by mixing such Powders we are not to expect a strong and full white, such as is that of Paper, but some dusky obscure one, such as might arise from a mixture of light and darkness, or from white and black, that is, a grey, or dun, or russet brown, such as are the Colours of a Man's Nail, of a Mouse, of Ashes, or ordinary Stones, of Mortar, of Dust and Dirt in Highways, and the like. And such a dark white I have often produced by mixing coloured Powders . . .

Now considering that these grey and dun Colours may be also produced by mixing whites and blacks, and by consequence differ from perfect whites not in Species of Colours but only in degree of luminousness, it is manifest that there is nothing more requisite to make them perfectly white than to increase their Light sufficiently; and, on the contrary, if by increasing their Light they can be brought to perfect whiteness, it will thence also follow, that they are of the same Species of Colour with the best whites, and differ from them only in the quantity of Light. And this I tryed as follows. I took the third of the above-mentioned grey mixtures (*see directions at the head of this article—Ed.*) and rubbed it thickly upon the floor of my Chamber, where the Sun shone upon it through the opened Casement; and by it, in the shadow, I laid a piece of white Paper of the same bigness. Then going from them to the distance of 12 or 18 Feet, so that I could not dis-

cern the unevenness of the surface of the Powder, nor the little shadows let fall from the gritty particles thereof; the Powder appeared intensely white, so as to transcend even the Paper itself in whiteness, especially if the Paper were a little shaded from the Light of the Clouds, and then the Paper compared with the Powder appeared of such a grey Colour as the Powder had done before. But by laying the Paper where the Sun shines through the Glass of the Window, or by shutting the Window that the Sun might shine through the Glass upon the Powder, and by such other fit means of increasing or decreasing the Lights wherewith the Powder and Paper were illuminated, the Light wherewith the Powder is illuminated may be made stronger in such a due proportion than the Light wherewith the Paper is illuminated, that they shall both appear exactly alike in whiteness. For when I was trying this, a Friend coming to visit me, I stopt him at the door, and before I told him what the Colours were, or what I was doing; I askt him, Which of the two whites were the best, and wherein they differed? And after he had at that distance viewed them well, he answered, That they were both good whites, and that he could not say which was best, nor wherein their Colours differed. Now if you consider, that this white of the Powder in the Sun-shine was compounded of the Colours which the component Powders . . . have in the same Sunshine, you must acknowledge by this Experiment, as well as by the former, that perfect whiteness may be compounded of Colours.

Sir Isaac Newton was born December 25, 1642 and died March 20, 1727. In 1661 he entered Cambridge University, where he spent so large a part of his life. During 1666, when the University was closed on account of the plague epidemic, Newton, then 24 years old, invented "fluxions," or the calculus, and began the study of the force of gravitation. Twenty years later, after newer data on the orbits of Jupiter and Saturn had checked his calculations, the gravitational theory was published in the *Principia*. The experiments on light, published under the title of "*Opticks*" in 1704, were presented to the Royal Society in 1672, when Newton was 30 years of age.

Science News-Letter, November 12, 1927

There are more than 300,000 oil wells in the United States.

There are 500,000 feeble-minded persons in institutions in this country, and 2,000,000 more that need institutional care, says a eugenics expert.

Quake in Pacific

A point on the edge of the continental shelf, in the Pacific Ocean, and about 125 miles off the coast at Los Angeles, was the center of the earthquake felt on Friday morning, November 4. From the study of seismograph records gathered by Science Service, earthquake experts of the U. S. Coast and Geodetic Survey have determined the epicenter as being at 33 degrees north latitude and 121 degrees west longitude. The quake took place at 8:50 a. m. Eastern Standard Time.

Records of the earthquake were reported from the seismograph station of the Survey at Tucson, Arizona; from those of the Jesuit Seismological Association at Georgetown University, Washington; Fordham University, New York; Regis College, Denver, Colorado; and St. Louis University, St. Louis; and from stations at the University of California, Berkeley; the Weather Bureau, Chicago, Ill.; the Dominion Observatory, Ottawa, Canada, and the Meteorological Observatory, Victoria, B. C.

Science News-Letter, November 12, 1927

SOCIOLOGY

Attacks High Hospital Fees

"Hospitalization for the patient of moderate means," was the slogan of the address by Dr. R. G. Brodrick, president of the American Hospital Association, opening its annual convention at Minneapolis on October 11.

"It seems to me that the chief aim of this Association," declared Dr. Brodrick, "should be to foster any movement that offers a reasonable solution of the problem of providing hospitalization for the great bulk of people of moderate means with whom illness today is a terrible calamity, not so much because of the gravity of the illness, but rather because of their inability to meet the extraordinary expenses."

"For the care of the poor, society through public and private agencies has provided the medical, surgical and nursing attention, quite equal to that procurable by the wealthy, but the people whose normal economic expectancy is neither want nor wealth, are those upon whom illness falls most heavily."

Compulsory sickness insurance was suggested by Dr. Brodrick as a possible means of meeting the problem of hospital service for the patient of moderate means who constitutes 80 per cent. of the whole population.

Science News-Letter, November 12, 1927

GEOLOGY

Quietude: A Prayer

God of all flesh, when these my days are sped
Let me but hear the music of the spheres
Or see, far off, the progress of the years
And I shall be greatwhile content though dead;
For to their heavenly music I am wed
And thrill with subtle thrills, nor yield to fears.
Thy great To-morrow wipes away all tears
And there, as here, Thy law shall be our bread.
Then let me dwell in some great quiet place
Where I may brood in peace on time's deep things
And all the mystery that round man clings;
Far off, mayhap, have glimpse of one sweet face;
And catch the tones of twanging golden strings
Whereto Thy myriad million stars keep pace.

—The late Erwin F. Smith, in *Science*.

Science News-Letter, November 12, 1927

PHILOSOPHY

Our New World

By C. E. AYRES

On the surface modern life is very different from what the human race has ever known before. These tremendous cities and thundering machines, these specialized occupations and standardized enjoyments, give an appearance to life very different from any it has ever had before. Nineveh and Tyre, Athens, Carthage, Rome, Byzantium, Paris of the time of Abelard, Florence of the time of Leonardo, London of the time of Shakespeare, were all very much of a piece compared with New York of the time of Edison. The differences among them are great; but they are not so great as the difference between each one and New York. Not even the differences between any of these and the aboriginal cities of Egyptian, Minoan, or, for that matter, Mayan civilization compares with the difference between Shakespeare's London and New York. The industrial revolution represents a major cleavage in the history of civilization, a fault line not between two hillocks but between two mountain ranges. What lies beyond is somehow separated from all that lies before.—Quotation from *Science: the False Messiah*—Bobbs-Merrill.

Science News-Letter, November 12, 1927

Goldfish Are Hardy

Goldfish are hardy creatures and stand the discomforts of travel better than most varieties of fish which the express companies are called upon to transport, according to the U. S. Fisheries Service. Government experts on the ways of fishes were recently requested by one of the large express concerns to look into the means at present employed in the shipping of goldfish. They found that in the rather crowded cans commonly used, the fish soon exhausted the supply of oxygen dissolved in the water, and thereafter kept alive by staying at the surface almost all the time and gulping air. Very small losses were occasioned by lack of oxygen, but more serious difficulties arose if waste products and slime were allowed to accumulate at the bottom of the cans. This was not ordinarily removed when the water was changed by being poured off, but when the water was drained by siphoning from the bottom the trouble was eliminated. The Fisheries Service recommends the use of wide, flat cans for shipping goldfish, and frequent changes of water with complete removal of bottom refuse.

Science News-Letter, November 12, 1927

HYGIENE

Eat When Happy

"Never eat when you are tired," is one of the primary rules of health laid down by Dr. Robert E. Humphreys of the New Jersey Orthopedic Hospital at Orange, New Jersey.

"We do everything in a rush, and then brag about it," declares Dr. Humphreys in a discussion of the psychology of eating, which will appear in a forthcoming issue of the *Journal of Public Health*. "This undoubtedly leads to many serious mistakes and much ill-health."

"In order to keep a child healthy he must be kept happy; he must not be forced to eat when he does not want to eat; and he must not be allowed to eat unless he is rested. Children worry much more than people are aware. As most children live in crowded communities, they must be constantly on their guard against all kinds of things, street cars, automobiles, trains and the like. They are constantly in fear of something, which disturbs their digestion and their metabolism. Many of them congregate and play together; this leads to fights which also upset their digestion."

Science News-Letter, November 12, 1927

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Science News-Letter, November 12, 1927

THE HUMAN HABITAT—Ellsworth Huntington—*Van Nostrand* (\$3). A very readable account of the influence of geographic factors, especially climate, on the rise and fall of civilizations. The author ranges to every corner of inhabited lands and draws on all periods of history for materials.

Science News-Letter, November 12, 1927

INDUSTRY'S COMING OF AGE—Rexford Guy Tugwell—*Harcourt, Brace* (\$3). Here is a survey of the recent technological history of industry. The author presents theories to account for increased production. Barriers to further advance such as lack of intelligent direction and the traditionalized and backward profession of economics are canvassed and remedies indicated.

Science News-Letter, November 12, 1927

STEAM WELLS AND OTHER THERMAL ACTIVITY AT "THE GEYSERS," CALIFORNIA—E. T. Allen and Arthur L. Day—*Carnegie Institution* (\$2.25). An interesting pioneer effort in the utilization of geothermal power here receives complete and authoritative scientific treatment.

Science News-Letter, November 12, 1927

INDUSTRIAL RESEARCH LABORATORIES OF THE UNITED STATES—Bulletin 60—Compiled by Clarence J. West and Ervye L. Risher—*National Research Council* (\$1). A revised and enlarged third edition. The original edition of 1920 listed about 300 industrial laboratories, the present contains data on 1000 laboratories.

Science News-Letter, November 12, 1927

TRANSACTIONS OF THE AMERICAN GEOPHYSICAL UNION—Meeting of April, 1927—*National Research Council* (\$3). Reports and papers dealing with the scientific discussion of geodesy, seismology, meteorology, terrestrial magnetism and electricity, oceanography, volcanology, and other problems of the figure and physics of the earth.

Science News-Letter, November 12, 1927

DIRECTING MENTAL ENERGY—Francis Aveling—*Doran* (\$2.50). Contains much information about recent research on mental efficiency by a leading British psychologist. The author's aim—to show how we can make economies in our mental and physical energy—suggests a practical working text book of applied psychology. In a sense he achieves this purpose. His objective and impersonal presentation of the subject will be useful to the psychologist applying science in factories, laboratories, and schools. The lay reader, however, will find comparatively little in the discussion that he can transfer direct to his daily life.

Science News-Letter, November 12, 1927

SEX AND REPRESSION IN SAVAGE SOCIETY—Bronislaw Malinowski—*Harcourt, Brace* (\$3.50). Principles of psychonanalysis are herein applied to primitive men and women in order to make clearer their mental attitude toward courtship, mating, and family ties. While not agreeing with Freud in many points, Dr. Malinowski uses his method of approach and shows that in primitive society conflicts and repressions affect behavior just as among higher civilizations.

Science News-Letter, November 12, 1927

VACUUM TUBE AMPLIFIERS FOR AUDIO-FREQUENCY CURRENTS—Walter Joseph Creamer—*University of Maine* (50c). A booklet that explains some fundamentals of radio in a scientific yet understandable way.

Science News-Letter, November 12, 1927

FOREST AND WATER—Raphael Zon—*U. S. Department of Agriculture*. An important summary and bibliography of a subject that is intimately connected with Mississippi flood relief and prevention.

Science News-Letter, November 12, 1927

UPTON SINCLAIR—Floyd Dell—*Doran* (\$2). In the field of economic and sociological writings Upton Sinclair holds a unique place. Why this is so is clearly and interestingly developed in this critical biography.

Science News-Letter, November 12, 1927

MAINTENANCE OF INTERIOR MARBLE—Bureau of Standards Technologic Paper 350—D. W. Kessler—*Government Printing Office* (35c). The practice and theory of cleaning marble.

Science News-Letter, November 12, 1927

TEXTBOOK OF GENERAL ZOOLOGY—Winterton C. Curtis and Mary J. Guthrie—*Wiley* (\$3.75). A college textbook, complete and well illustrated.

Science News-Letter, November 12, 1927

SERUM DIAGNOSIS OF SYPHILIS BY PRECIPITATION—R. L. Kahn—*Williams and Wilkins*. An account of the development, standardization and clinical application of the author's test to determine syphilis.

Science News-Letter, November 12, 1927

MUSIC

The Medieval Hurdy-Gurdy

Quotation from *HANDBOOK OF THE COLLECTION OF MUSICAL INSTRUMENTS IN THE U. S. NATIONAL MUSEUM*—Frances Densmore—U. S. Government Printing Office.

The earliest stringed instrument fitted with keys was probably the hurdy-gurdy, which in the Middle Ages was almost as popular as the pianoforte of the present day. It should be understood that the hurdy-gurdy of medieval times was in no way related to the street organ which in modern times is called by that name. It has always been associated with rural life, like the bagpipe, but in the first half of the eighteenth century it contributed to the amusement of the French higher classes during the years when mock shepherds and shepherdesses were in vogue. It is also called a vielle. The old Latin name for the hurdy-gurdy was organistrum, and this form of instrument was so large that it took two persons to play it. The instrument was so long that two players laid it across their knees, and one turned the crank while the other touched the keys. A typical instrument had only one melody string.

The hurdy-gurdy is allied to both bowed and keyed instruments, as its strings are frictioned and their vibrating length is affected by keys. The friction is accomplished by a wheel, operated by a crank which the player turns with his right hand. Four of the five strings are drones, and sound continuously unless moved away from the wheel by a simple contrivance. The melody string over the body of the instrument, and its vibrating length is changed for each note by the pressing of a key, as a violinist stops a string with his fingers. Sometimes two melody strings are used, the pair being tuned in unison. Thus the instrument played a melody with an accompaniment of drone tones, but could not be used for playing part music. As this form of music was greatly enjoyed by the people, the hurdy-gurdy gradually gave way to instruments on which it could be played.

Science News-Letter, November 12, 1927

Do It Early—By Mail

BOOKS undoubtedly are highly satisfactory as Christmas remembrances. The presentation of a book is not only an acknowledgment of the Season, not only an expression of good will. It is a subtle compliment to the intelligence of the recipient. It is, moreover, an implication of intelligence in the donor.

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